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Abstract

NEUTRON MODERATION IN HYDROGENOUS MEDIA

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This report deals with neutron moderation and diffusion in various hydrogenous media.

The first part of the report describes the method of measuring neutron spatial distribution in "bounded" media and presents some results of experimental investigation of spatial distribution of neutrons in various media.

The effect of the dimensions (width) of the neutron fission source and of the geometrical structure of the medium (heterogeneity) upon the neutron spatial distribution was determined for those neutrons which have been moderated down to 1.46 ev.

The second part of the report presents the results of the thermal neutron diffusion measurements performed by pulsed technique for a number of hydrogenous substances in a temperature range from t melting to t boiling.

The diffusion coefficient was obtained in the form

$$D(v) = \text{const.}\ v^{a},$$

where a is the function of molecular structure of the substance. The value D(v) allows one to calculate the transport length and transport cross-section per atom of bounded hydrogen.

It was found that the value of the transport cross-section per atom of hydrogen strongly depends upon the molecular structure of the investigated hydrogenous medium. The example for $[C_{15}H_{16}]$ was a = 2.58 and σ^{H}_{t2} = 86 barns, for $[C_{12}H_{10}]$ a = 1.33 and σ^{H}_{t2} = 31 barns.

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